

The figures that he publishes in italics are simply the maxima and minima, which are italicized in order to attract attention.

Fuller details relative to this subject may be found in the Handbook of Astronomy by Wolf; the article by A. Wolfer in the Met. Zeit., 1892; the Bibliothèque universelle de Genève, Archives des sciences physiques et naturelles, 1891, Vol. XXVI, No. 12, and especially in the annual publication known as the Astronomische Mittheilungen, which was begun by Dr. R. Wolf, and is now continued by A. Wolfer regularly in the Vierteljahrsschrift of the Scientific Society of Zurich.

Those who compare sun-spot numbers with meteorological phenomena should always bear in mind that the spots themselves are not likely to be the cause of changes on the earth, but are rather the result of some process in the sun that affects the earth directly.—C. A.

Relative frequencies of sun spots.

[From Klein's Jahrbuch der Astronomie u. Geophysik III. 1892-1900 and Wolfer's Astr. Mitt. 1901.]

| Year. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Mean. |
|---------|----------|-----------|--------|--------|-------|-------|-------|---------|------------|----------|-----------|-----------|-------|
| 1749... | 58.0 | 62.6 | 70.0 | 55.7 | 85.0 | 88.5 | 94.8 | 66.3 | 75.9 | 75.5 | 154.6 | 85.2 | 80.9 |
| 1750... | 73.8 | 75.9 | 89.2 | 88.3 | 90.0 | 100.0 | 85.4 | 108.0 | 91.2 | 65.7 | 63.8 | 75.4 | 83.4 |
| 1751... | 70.0 | 75.9 | 45.3 | 56.4 | 60.0 | 70.0 | 66.3 | 59.8 | 39.5 | 23.2 | 28.5 | 44.0 | 47.7 |
| 1752... | 35.0 | 50.0 | 71.0 | 59.3 | 59.7 | 39.6 | 78.4 | 29.8 | 27.1 | 46.6 | 37.6 | 40.0 | 47.8 |
| 1753... | 41.0 | 32.0 | 45.7 | 88.0 | 86.0 | 31.7 | 22.0 | 39.0 | 28.0 | 25.0 | 20.0 | 6.7 | 80.7 |
| 1754... | 0.0 | 3.0 | 1.7 | 18.7 | 30.7 | 26.7 | 18.8 | 12.3 | 8.2 | 24.1 | 13.2 | 4.2 | 12.2 |
| 1755... | 10.2 | 11.2 | 6.8 | 6.5 | 0.0 | 0.0 | 8.6 | 3.2 | 17.8 | 23.7 | 6.8 | 20.0 | 9.6 |
| 1756... | 12.5 | 7.1 | 5.4 | 9.4 | 12.5 | 12.9 | 3.6 | 6.4 | 11.8 | 14.3 | 17.0 | 9.4 | 10.2 |
| 1757... | 14.1 | 21.2 | 26.2 | 30.0 | 38.1 | 12.8 | 25.0 | 51.3 | 89.7 | 32.5 | 64.7 | 39.5 | 32.4 |
| 1758... | 37.6 | 52.0 | 49.0 | 72.8 | 46.4 | 45.0 | 44.0 | 38.7 | 62.5 | 37.7 | 43.0 | 43.0 | 47.6 |
| 1759... | 48.3 | 44.0 | 46.8 | 47.0 | 49.0 | 50.0 | 51.0 | 71.3 | 77.2 | 59.7 | 46.3 | 57.0 | 54.0 |
| 1760... | 67.3 | 59.5 | 74.7 | 59.3 | 72.0 | 48.3 | 66.0 | 75.6 | 61.3 | 50.6 | 59.7 | 61.0 | 62.9 |
| 1761... | 70.0 | 91.0 | 80.7 | 71.7 | 107.2 | 99.3 | 94.1 | 91.1 | 100.7 | 89.7 | 46.0 | 65.0 | 85.8 |
| 1762... | 48.8 | 72.8 | 45.7 | 60.2 | 39.9 | 77.1 | 33.8 | 67.7 | 68.5 | 69.3 | 77.8 | 77.2 | 61.1 |
| 1763... | 56.5 | 31.9 | 34.3 | 32.9 | 32.7 | 35.8 | 54.2 | 26.5 | 68.1 | 46.3 | 60.9 | 61.4 | 45.1 |
| 1764... | 59.7 | 59.7 | 40.2 | 34.4 | 44.3 | 30.0 | 30.0 | 30.0 | 28.2 | 28.0 | 26.0 | 25.7 | 26.3 |
| 1765... | 24.0 | 26.0 | 25.0 | 23.0 | 20.2 | 20.0 | 27.0 | 29.7 | 16.0 | 14.0 | 14.0 | 13.0 | 20.9 |
| 1766... | 12.0 | 11.0 | 86.6 | 6.0 | 26.8 | 3.0 | 3.3 | 4.0 | 4.3 | 5.0 | 5.7 | 19.2 | 11.4 |
| 1767... | 27.4 | 30.0 | 43.0 | 39.9 | 29.8 | 39.3 | 21.9 | 40.8 | 42.7 | 44.1 | 54.7 | 53.8 | 37.8 |
| 1768... | 58.5 | 66.1 | 46.3 | 49.7 | 77.7 | 77.4 | 52.6 | 66.8 | 74.8 | 77.8 | 90.6 | 111.8 | 69.8 |
| 1769... | 73.9 | 64.2 | 64.3 | 92.7 | 78.6 | 94.4 | 118.6 | 120.3 | 148.8 | 158.2 | 148.1 | 112.0 | 106.1 |
| 1770... | 104.0 | 142.5 | 80.0 | 51.0 | 70.1 | 88.3 | 109.8 | 126.3 | 104.4 | 108.6 | 122.2 | 102.8 | 100.8 |
| 1771... | 86.0 | 46.2 | 46.7 | 49.9 | 152.7 | 119.5 | 67.7 | 59.5 | 101.4 | 90.0 | 99.7 | 95.7 | 81.8 |
| 1772... | 100.9 | 90.8 | 91.1 | 92.2 | 38.0 | 57.0 | 77.3 | 56.2 | 50.5 | 78.6 | 61.3 | 64.0 | 66.5 |
| 1773... | 54.6 | 29.0 | 51.2 | 32.9 | 41.1 | 25.4 | 27.7 | 12.7 | 29.3 | 26.3 | 40.9 | 43.2 | 34.8 |
| 1774... | 46.8 | 65.4 | 55.7 | 43.8 | 51.8 | 28.5 | 17.5 | 6.6 | 7.9 | 14.0 | 17.7 | 12.2 | 30.6 |
| 1775... | 4.4 | 0.0 | 11.6 | 11.2 | 3.9 | 12.3 | 1.0 | 7.2 | 3.2 | 5.6 | 15.1 | 7.9 | 7.0 |
| 1776... | 21.7 | 11.6 | 6.3 | 21.8 | 11.2 | 19.0 | 1.6 | 24.2 | 16.0 | 30.0 | 35.0 | 40.0 | 19.8 |
| 1777... | 45.0 | 36.5 | 39.0 | 95.0 | 80.3 | 80.7 | 95.0 | 112.0 | 116.2 | 106.5 | 146.0 | 157.3 | 92.0 |
| 1778... | 177.3 | 109.3 | 134.0 | 245.0 | 238.9 | 171.6 | 153.0 | 140.0 | 171.7 | 156.3 | 150.3 | 105.0 | 134.4 |
| 1779... | 114.7 | 165.7 | 118.0 | 145.0 | 140.0 | 113.7 | 143.0 | 112.0 | 111.0 | 124.0 | 114.0 | 110.0 | 125.9 |
| 1780... | 70.0 | 98.0 | 98.0 | 95.0 | 107.2 | 89.0 | 86.0 | 86.0 | 93.7 | 77.0 | 60.0 | 58.7 | 74.8 |
| 1781... | 98.7 | 74.7 | 53.0 | 68.3 | 104.7 | 97.7 | 73.5 | 66.0 | 51.0 | 37.3 | 67.0 | 35.2 | 68.1 |
| 1782... | 54.0 | 87.5 | 87.0 | 41.0 | 54.3 | 39.0 | 37.0 | 44.0 | 34.0 | 23.2 | 31.5 | 30.0 | 38.5 |
| 1783... | 28.3 | 36.7 | 26.7 | 28.3 | 29.0 | 25.2 | 32.2 | 20.0 | 18.0 | 8.0 | 15.0 | 10.5 | 22.8 |
| 1784... | 13.0 | 8.0 | 11.0 | 10.0 | 6.0 | 9.0 | 8.0 | 10.0 | 10.0 | 8.0 | 17.0 | 14.0 | 10.2 |
| 1785... | 6.5 | 8.0 | 9.0 | 15.7 | 20.7 | 26.8 | 36.3 | 20.0 | 32.0 | 47.2 | 40.2 | 27.3 | 24.1 |
| 1786... | 37.2 | 47.6 | 47.7 | 85.4 | 92.8 | 59.0 | 89.0 | 89.7 | 117.3 | 112.8 | 116.0 | 112.7 | 92.9 |
| 1787... | 134.7 | 106.0 | 87.4 | 127.2 | 184.8 | 99.2 | 128.0 | 137.2 | 157.3 | 153.0 | 141.5 | 174.0 | 132.0 |
| 1788... | 138.0 | 129.2 | 143.3 | 108.5 | 113.0 | 154.2 | 141.5 | 136.0 | 141.0 | 142.0 | 94.7 | 129.5 | 130.9 |
| 1789... | 114.0 | 125.3 | 120.0 | 123.8 | 123.5 | 120.0 | 117.0 | 103.0 | 112.0 | 89.7 | 134.0 | 135.5 | 118.1 |
| 1790... | 103.0 | 127.5 | 96.3 | 94.0 | 93.0 | 91.0 | 69.3 | 87.0 | 77.8 | 84.3 | 89.0 | 74.0 | 89.9 |
| 1791... | 72.7 | 62.0 | 74.0 | 77.2 | 73.7 | 64.2 | 71.0 | 43.0 | 66.5 | 61.7 | 67.0 | 66.0 | 66.6 |
| 1792... | 53.0 | 64.0 | 63.0 | 75.7 | 62.0 | 61.0 | 45.8 | 60.0 | 59.0 | 59.0 | 57.0 | 56.0 | 60.0 |
| 1793... | 56.0 | 55.0 | 55.5 | 53.0 | 53.3 | 51.0 | 50.0 | 29.3 | 24.0 | 47.0 | 44.0 | 45.7 | 46.9 |
| 1794... | 45.0 | 44.0 | 89.0 | 28.4 | 55.7 | 41.5 | 41.0 | 40.0 | 11.1 | 28.5 | 67.4 | 51.4 | 41.0 |
| 1795... | 21.4 | 39.9 | 12.6 | 18.6 | 81.0 | 17.1 | 12.9 | 25.7 | 13.5 | 19.5 | 25.0 | 18.0 | 21.3 |
| 1796... | 22.0 | 23.8 | 15.7 | 31.7 | 21.0 | 6.7 | 26.9 | 1.5 | 18.4 | 11.0 | 8.4 | 5.1 | 16.0 |
| 1797... | 14.4 | 4.2 | 4.0 | 4.0 | 7.1 | 11.1 | 4.8 | 6.0 | 5.7 | 6.9 | 5.8 | 3.0 | 6.4 |
| 1798... | 2.0 | 4.0 | 12.4 | 1.1 | 0.0 | 0.0 | 0.0 | 3.0 | 2.4 | 1.5 | 12.5 | 9.9 | 4.1 |
| 1799... | 1.6 | 13.6 | 21.7 | 8.4 | 8.2 | 10.6 | 3.1 | 0.0 | 0.0 | 4.6 | 2.7 | 8.6 | 6.8 |
| 1800... | 6.9 | 9.8 | 13.9 | 10.2 | 5.0 | 23.7 | 21.0 | 19.5 | 11.5 | 12.3 | 10.5 | 40.1 | 15.3 |
| 1801... | 27.0 | 29.0 | 30.0 | 31.0 | 39.0 | 31.2 | 35.0 | 33.7 | 33.5 | 32.6 | 39.8 | 45.2 | 34.0 |
| 1802... | 47.8 | 47.0 | 40.8 | 50.0 | 58.0 | 55.0 | 57.0 | 58.0 | 65.2 | 56.5 | 65.5 | 64.0 | 55.0 |
| 1803... | 66.0 | 67.0 | 68.0 | 69.0 | 71.0 | 72.0 | 73.0 | 64.0 | 75.0 | 76.0 | 77.0 | 77.0 | 71.3 |
| 1804... | 7.0 | 75.0 | 77.0 | 77.0 | 77.0 | 76.0 | 74.0 | 72.0 | 71.0 | 71.2 | 67.0 | 63.0 | 73.1 |
| 1805... | 61.0 | 59.0 | 56.0 | 48.3 | 39.0 | 49.0 | 47.0 | 46.0 | 44.0 | 43.0 | 41.0 | 40.0 | 47.6 |
| 1806... | 39.0 | 29.6 | 28.0 | 84.0 | 26.4 | 25.6 | 31.0 | 29.0 | 28.0 | 27.0 | 25.0 | 24.0 | 28.9 |
| 1807... | 12.0 | 12.2 | 9.6 | 18.3 | 10.0 | 10.2 | 12.7 | 12.0 | 6.7 | 8.0 | 2.6 | 0.0 | 9.4 |
| 1808... | 0.0 | 4.5 | 0.0 | 12.3 | 8.6 | 12.0 | 6.7 | 8.0 | 11.7 | 4.7 | 11.3 | 12.2 | 7.7 |
| 1809... | 7.2 | 9.2 | 0.9 | 2.5 | 2.0 | 7.7 | 0.3 | 0.2 | 0.4 | 0.0 | 0.0 | 0.0 | 2.5 |
| 1810... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1811... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.6 | 0.0 | 2.4 | 6.1 | 0.8 | 1.1 | 1.4 |
| 1812... | 13.4 | 1.9 | 0.7 | 0.0 | 1.0 | 1.8 | 0.5 | 18.7 | 5.2 | 5.5 | 7.9 | 10.1 | 5.5 |
| 1813... | 0.0 | 10.3 | 1.9 | 16.6 | 5.5 | 10.7 | 15.7 | 8.4 | 18.2 | 30.5 | 16.7 | 19.6 | 12.8 |
| 1814... | 22.2 | 12.0 | 5.7 | 23.1 | 5.8 | 14.9 | 18.5 | 2.3 | 11.9 | 21.5 | 14.5 | 20.1 | 14.4 |
| 1815... | 19.2 | 32.2 | 26.2 | 31.6 | 9.8 | 55.9 | 35.3 | 47.2 | 31.5 | 35.5 | 37.2 | 65.0 | 35.4 |
| 1816... | 26.3 | 68.8 | 73.7 | 58.8 | 44.3 | 48.6 | 38.8 | 38.1 | 49.3 | 56.4 | 36.2 | 30.6 | 46.4 |
| 1817... | 36.5 | 55.2 | 107.0 | 25.9 | 19.2 | 39.9 | 47.4 | 45.4 | 35.8 | 25.2 | 36.5 | 23.9 | 41.5 |
| 1818... | 35.1 | 18.9 | 22.1 | 35.7 | 53.1 | 36.1 | 28.1 | 30.9 | 27.4 | 33.2 | 13.3 | 25.8 | 30.0 |
| 1819... | 34.4 | 20.7 | 3.7 | 20.2 | 18.4 | 35.7 | 33.9 | 25.8 | 14.9 | 27.6 | 21.0 | 30.6 | 24.2 |
| 1820... | 13.0 | 26.6 | 3.6 | 18.5 | 29.3 | 10.8 | 23.8 | 26.3 | 5.2 | 8.7 | 7.9 | 8.2 | 15.0 |
| 1821... | 21.5 | 2.4 | 5.7 | 6.0 | 1.2 | 1.8 | 2.5 | 4.8 | 4.4 | 18.3 | 4.4 | 0.0 | 6.1 |
| 1822... | 0.0 | 0.9 | 16.1 | 13.3 | 1.5 | 5.6 | 7.9 | 2.1 | 0.0 | 0.4 | 0.0 | 0.0 | 4.0 |
| 1823... | 0.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 30.4 | 1.8 |

Relative frequencies of sun spots—Continued.

| Year. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Mean. |
|-------|----------|-----------|--------|--------|-------|-------|-------|---------|------------|----------|-----------|-----------|-------|
| 1824 | 21.6 | 10.8 | 0.0 | 20.0 | 2.8 | 0.0 | 0.0 | 1.4 | 20.5 | 25.2 | 0.0 | 0.8 | 8.0 |
| 1825 | 5.0 | 16.1 | 14.9 | 0.4 | 15.0 | 15.4 | 30.9 | 25.4 | 16.3 | 14.4 | 11.5 | 22.5 | 15.6 |
| 1826 | 17.7 | 18.2 | 38.2 | 23.7 | 32.4 | 37.1 | 52.5 | 39.6 | 18.9 | 51.0 | 38.3 | 64.5 | 36.0 |
| 1827 | 34.3 | 46.0 | 56.0 | 46.0 | 55.5 | 56.7 | 42.9 | 53.7 | 49.6 | 57.2 | 48.2 | 46.1 | 49.4 |
| 1828 | 52.8 | 64.4 | 65.0 | 61.1 | 69.1 | 96.0 | 54.3 | 76.4 | 50.4 | 34.7 | 57.0 | 46.9 | 62.5 |
| 1829 | 43.0 | 49.4 | 72.8 | 97.6 | 67.5 | 75.5 | 90.8 | 77.4 | 50.3 | 60.6 | 66.7 | 56.5 | 67.3 |
| 1830 | 49.9 | 70.9 | 84.6 | 107.1 | 66.3 | 65.1 | 43.9 | 50.7 | 62.1 | 84.4 | 81.2 | 92.1 | 70.7 |
| 1831 | 47.5 | 50.1 | 93.4 | 54.6 | 38.1 | 35.4 | 45.2 | 54.9 | 37.9 | 46.2 | 43.5 | 28.9 | 47.8 |
| 1832 | 30.9 | 55.5 | 55.1 | 26.9 | 41.3 | 26.7 | 18.9 | 8.9 | 8.2 | 21.1 | 14.3 | 37.5 | 27.5 |
| 1833 | 11.3 | 14.9 | 11.8 | 2.8 | 12.9 | 1.0 | 7.0 | 5.7 | 11.6 | 7.5 | 5.9 | 9.9 | 8.5 |
| 1834 | 4.9 | 18.1 | 8.9 | 1.4 | 8.8 | 7.8 | 8.7 | 4.0 | 11.5 | 24.8 | 30.5 | 34.5 | 13.2 |
| 1835 | 7.5 | 24.5 | 19.7 | 61.5 | 43.6 | 33.2 | 59.8 | 59.0 | 100.8 | 95.2 | 100.0 | 77.5 | 56.9 |
| 1836 | 88.6 | 107.6 | 98.1 | 142.9 | 111.4 | 124.7 | 116.7 | 107.8 | 95.1 | 137.4 | 130.9 | 206.2 | 121.8 |
| 1837 | 188.0 | 175.6 | 134.6 | 138.2 | 111.3 | 153.0 | 162.8 | 134.0 | 96.3 | 123.7 | 107.0 | 129.8 | 138.2 |
| 1838 | 144.9 | 84.8 | 140.8 | 126.6 | 187.6 | 195.5 | 108.2 | 78.8 | 75.6 | 90.8 | 77.4 | 79.8 | 108.1 |
| 1839 | 107.6 | 102.5 | 77.7 | 61.8 | 53.8 | 54.6 | 84.7 | 131.2 | 132.7 | 90.8 | 68.8 | 63.6 | 85.6 |
| 1840 | 81.2 | 87.7 | 55.5 | 65.9 | 69.2 | 45.5 | 60.7 | 57.8 | 74.0 | 49.8 | 54.3 | 58.7 | 68.2 |
| 1841 | 24.0 | 29.9 | 29.7 | 42.6 | 67.4 | 55.7 | 30.8 | 39.3 | 35.1 | 28.5 | 19.8 | 38.8 | 26.8 |
| 1842 | 20.4 | 22.1 | 21.7 | 26.9 | 24.9 | 20.5 | 12.6 | 26.5 | 18.5 | 38.1 | 40.5 | 17.6 | 24.4 |
| 1843 | 13.3 | 8.5 | 6.3 | 8.8 | 21.1 | 10.5 | 9.5 | 11.8 | 4.2 | 5.8 | 19.1 | 12.7 | 10.7 |
| 1844 | 9.4 | 14.7 | 13.6 | 20.8 | 12.0 | 3.7 | 21.2 | 23.9 | 6.9 | 21.5 | 10.7 | 21.6 | 15.0 |
| 1845 | 25.7 | 43.6 | 43.3 | 56.9 | 47.8 | 31.1 | 30.6 | 32.3 | 29.6 | 40.7 | 39.4 | 59.0 | 40.1 |
| 1846 | 38.7 | 51.0 | 63.9 | 69.2 | 59.0 | 65.1 | 46.5 | 54.8 | 107.1 | 55.9 | 60.4 | 65.5 | 61.5 |
| 1847 | 62.6 | 44.9 | 85.7 | 44.7 | 75.2 | 35.3 | 52.2 | 140.6 | 161.2 | 180.4 | 138.9 | 109.6 | 96.4 |
| 1848 | 159.1 | 111.8 | 103.9 | 107.1 | 102.3 | 133.8 | 139.2 | 132.5 | 130.3 | 132.4 | 114.6 | 159.9 | 124.3 |
| 1849 | 156.7 | 181.1 | 95.5 | 102.5 | 80.6 | 81.2 | 78.0 | 61.3 | 58.7 | 71.5 | 99.7 | 97.0 | 95.9 |
| 1850 | 78.0 | 69.4 | 82.6 | 44.1 | 61.6 | 70.0 | 39.1 | 61.6 | 86.2 | 71.0 | 54.8 | 60.0 | 66.5 |
| 1851 | 75.5 | 105.4 | 61.6 | 56.5 | 62.6 | 63.2 | 36.1 | 57.4 | 67.9 | 62.5 | 50.9 | 71.4 | 64.5 |
| 1852 | 66.4 | 67.5 | 61.2 | 65.4 | 54.9 | 49.9 | 42.0 | 37.9 | 37.5 | 67.3 | 53.4 | 45.4 | 54.2 |
| 1853 | 41.1 | 42.9 | 37.7 | 47.6 | 34.7 | 40.0 | 45.9 | 50.9 | 35.5 | 42.3 | 28.8 | 28.4 | 39.0 |
| 1854 | 15.4 | 20.0 | 20.7 | 26.4 | 24.0 | 21.1 | 18.7 | 15.5 | 22.4 | 12.7 | 28.2 | 21.4 | 20.6 |
| 1855 | 12.3 | 11.4 | 17.4 | 4.4 | 9.1 | 5.3 | 0.4 | 3.1 | 0.0 | 9.7 | 4.2 | 3.1 | 6.7 |
| 1856 | 0.5 | 4.9 | 0.4 | 6.5 | 0.0 | 5.0 | 4.6 | 5.9 | 4.4 | 4.5 | 7.7 | 7.2 | 4.3 |
| 1857 | 13.7 | 7.4 | 5.2 | 11.1 | 29.2 | 16.0 | 22.2 | 16.9 | 42.4 | 40.6 | 31.4 | 37.2 | 22.8 |
| 1858 | 39.0 | 34.9 | 57.5 | 38.3 | 41.4 | 44.5 | 56.7 | 55.3 | 80.1 | 91.2 | 61.9 | 66.9 | 54.8 |
| 1859 | 83.7 | 87.6 | 90.3 | 85.7 | 91.0 | 87.1 | 95.2 | 106.8 | 105.8 | 114.6 | 97.2 | 91.0 | 93.8 |
| 1860 | 81.5 | 88.0 | 98.7 | 71.4 | 107.1 | 108.6 | 116.7 | 100.8 | 92.2 | 90.1 | 97.9 | 85.6 | 95.7 |
| 1861 | 63.3 | 77.8 | 101.0 | 98.5 | 66.8 | 87.8 | 78.0 | 82.5 | 79.9 | 67.2 | 53.7 | 80.5 | 77.2 |
| 1862 | 63.1 | 64.5 | 43.6 | 53.7 | 54.4 | 84.0 | 73.4 | 62.5 | 96.6 | 42.0 | 50.6 | 40.9 | 59.1 |
| 1863 | 48.3 | 56.7 | 66.4 | 40.6 | 58.8 | 40.8 | 32.7 | 48.1 | 22.0 | 39.9 | 37.7 | 41.2 | 44.0 |
| 1864 | 57.7 | 47.1 | 66.3 | 35.8 | 40.6 | 57.8 | 54.7 | 54.8 | 25.5 | 33.9 | 57.8 | 28.6 | 46.9 |
| 1865 | 48.7 | 30.3 | 39.5 | 29.4 | 34.5 | 36.8 | 26.8 | 37.8 | 21.6 | 17.1 | 24.6 | 12.8 | 30.5 |
| 1866 | 31.6 | 38.4 | 24.6 | 17.6 | 12.9 | 16.5 | 9.3 | 12.7 | 7.3 | 14.1 | 9.0 | 1.5 | 16.3 |
| 1867 | 0.0 | 0.7 | 9.2 | 5.1 | 2.9 | 1.5 | 5.0 | 4.9 | 9.8 | 13.5 | 9.3 | 25.2 | 7.3 |
| 1868 | 15.6 | 15.8 | 26.5 | 36.6 | 26.7 | 31.1 | 28.6 | 34.4 | 43.8 | 61.7 | 59.1 | 67.7 | 37.3 |
| 1869 | 50.9 | 59.8 | 52.7 | 41.0 | 104.0 | 106.4 | 59.2 | 73.6 | 80.6 | 59.4 | 77.4 | 104.3 | 73.9 |
| 1870 | 77.3 | 114.9 | 129.4 | 180.0 | 176.0 | 135.6 | 132.4 | 153.8 | 136.0 | 146.4 | 147.5 | 180.0 | 139.1 |
| 1871 | 83.3 | 125.3 | 143.2 | 162.4 | 145.5 | 91.7 | 103.0 | 110.0 | 80.3 | 89.0 | 105.4 | 90.3 | 111.2 |
| 1872 | 79.5 | 120.1 | 88.4 | 102.1 | 107.9 | 109.9 | 105.2 | 92.9 | 114.6 | 103.5 | 112.0 | 89.9 | 101.7 |
| 1873 | 86.7 | 107.0 | 96.3 | 76.2 | 47.9 | 44.8 | 66.9 | 68.2 | 47.5 | 47.4 | 55.4 | 49.2 | 66.3 |
| 1874 | 80.8 | 64.2 | 45.4 | 32.0 | 44.6 | 38.2 | 67.8 | 61.3 | 28.0 | 84.8 | 28.9 | 29.3 | 44.6 |
| 1875 | 14.6 | 22.2 | 31.8 | 29.1 | 11.5 | 23.9 | 12.5 | 14.6 | 2.4 | 12.7 | 17.7 | 9.9 | 17.1 |
| 1876 | 14.3 | 15.0 | 33.2 | 2.3 | 5.1 | 1.6 | 15.3 | 8.8 | 9.9 | 14.3 | 9.9 | 8.2 | 11.3 |
| 1877 | 24.4 | 8.7 | 11.7 | 15.8 | 21.2 | 13.4 | 5.9 | 6.3 | 16.4 | 6.7 | 14.5 | 2.3 | 12.3 |
| 1878 | 3.3 | 6.0 | 7.8 | 0.1 | 5.8 | 6.4 | 0.1 | 0.0 | 5.3 | 1.1 | 4.1 | 0.5 | 3.4 |
| 1879 | 0.8 | 0.6 | 0.0 | 6.2 | 2.4 | 4.8 | 7.5 | 10.7 | 6.1 | 12.3 | 12.9 | 9.2 | 6.0 |
| 1880 | 24.0 | 27.5 | 19.5 | 19.3 | 23.5 | 34.1 | 21.9 | 48.1 | 66.0 | 43.0 | 30.7 | 29.6 | 32.3 |
| 1881 | 36.4 | 53.2 | 51.5 | 51.7 | 43.5 | 60.5 | 76.9 | 58.0 | 53.2 | 64.0 | 54.8 | 47.3 | 54.3 |
| 1882 | 45.0 | 69.3 | 67.5 | 95.8 | 64.1 | 45.2 | 45.4 | 40.4 | 57.7 | 59.2 | 84.4 | 41.8 | 59.6 |
| 1883 | 60.6 | 46.9 | 42.8 | 82.1 | 32.1 | 76.5 | 80.6 | 46.0 | 52.6 | 88.8 | 84.5 | 75.9 | 63.7 |
| 1884 | 91.5 | 86.9 | 86.8 | 76.1 | 66.5 | 51.2 | 53.1 | 55.8 | 61.9 | 47.8 | 36.6 | 47.2 | 63.5 |
| 1885 | 42.8 | 71.8 | 49.8 | 55.0 | 73.0 | 83.7 | 66.5 | 50.0 | 39.6 | 38.7 | 33.3 | 21.7 | 52.2 |
| 1886 | 39.9 | 25.9 | 57.3 | 43.7 | 30.7 | 27.1 | 30.3 | 16.9 | 21.4 | 8.6 | 0.3 | 12.4 | 25.4 |
| 1887 | 10.3 | 13.2 | 4.2 | 6.9 | 20.0 | 15.7 | 23.3 | 21.4 | 7.4 | 6.6 | 6.9 | 20.7 | 13.1 |
| 1888 | 12.7 | 7.1 | 7.8 | 6.1 | 7.0 | 7.1 | 3.1 | 2.8 | 8.8 | 2.1 | 10.7 | 6.7 | 6.8 |
| 1889 | 0.8 | 8.5 | 7.0 | 4.3 | 2.4 | 6.4 | 9.7 | 20.6 | 6.5 | 2.1 | 0.2 | 6.7 | 6.3 |
| 1890 | 5.8 | 0.6 | 5.1 | 1.6 | 4.8 | 1.3 | 11.6 | 8.5 | 17.2 | 11.2 | 9.6 | 7.8 | 7.1 |
| 1891 | 17.1 | 23.0 | 10.0 | 19.4 | 43.2 | 48.7 | 59.1 | 32.6 | 52.1 | 50.4 | 41.0 | 80.6 | 35.6 |
| 1892 | 72.4 | 72.4 | 52.5 | 69.6 | 79.2 | 76.6 | 77.9 | 102.6 | 62.2 | 74.8 | 67.1 | 77.8 | 73.8 |
| 1893 | 75.0 | 73.0 | 65.7 | 88.1 | 84.7 | 88.2 | 88.8 | 129.2 | 77.9 | 79.7 | 75.1 | 98.8 | 84.9 |
| 1894 | 83.2 | 84.6 | 52.3 | 81.6 | 101.2 | 98.9 | 106.0 | 70.3 | 65.9 | 75.5 | 53.6 | 60.0 | 78.0 |
| 1895 | 63.3 | 67.2 | 61.0 | 76.9 | 67.5 | 71.5 | 47.8 | 68.9 | 87.7 | 67.9 | 47.2 | 70.7 | 64.0 |
| 1896 | 29.0 | 57.4 | 52.0 | 43.8 | 27.7 | 49.0 | 45.0 | 27.2 | 61.3 | 28.4 | 38.0 | 42.6 | 41.8 |
| 1897 | 40.6 | 29.4 | 39.3 | 31.0 | 20.0 | 11.3 | 27.6 | 21.8 | 48.1 | 14.3 | 8.4 | 33.3 | 26.2 |
| 1898 | 30.2 | 36.4 | 28.1 | 14.5 | 25.8 | 22.8 | 9.0 | 31.4 | 34.8 | 34.4 | 30.0 | 12.6 | 26.7 |
| 1899 | 19.5 | 9.2 | 18.1 | 14.2 | 7.7 | 20.5 | 13.5 | 2.9 | 8.4 | 13.0 | 7.8 | 10.5 | 12.1 |
| 1900 | 9.4 | 13.6 | 8.6 | 16.0 | 15.2 | 12.1 | 8.3 | 4.3 | 8.3 | 12.9 | 4.5 | 0.3 | 9.5 |

of lead pencils had been cut into sections about three-eighths of an inch in length. These were soon followed by others as large as walnuts, and later by still others slightly disk shaped, measuring fully 3 inches in diameter by 2 inches in thickness. The ground was covered with them, and several branches of trees were broken off. They were exceedingly hard and would rebound, when falling on the rocks, without breaking. They melted very slowly even when placed in the sun. When half melted many had the appearance of the human eye—a pupil in the center and a ring surrounding it, with fine lines radiating in all directions. Others were composed of hard crystals of ice, several stones often being frozen together; and still others were of frozen snow. The next morning at 8 o'clock remnants of hailstones as large as peas were lying on the ground.

During the storm the river presented a beautiful appearance, there being thousands of miniature fountains from a foot to 6 feet in height [spouting up where the hail plunged in.—C. A.].

At the conclusion of the storm, which altogether lasted ten minutes, the thermometer had fallen to 70°. Probably the same storm was noted by a friend of mine, on the same day, in a railway train north of Saratoga, N. Y., when some of the car windows were broken.

A half hour after the storm was over we gathered a pailful of the hailstones, rowed half a mile across the river, and had them photographed.

PLAGIARISM

The compilers of books and articles frequently have occasion to quote from previous authors. Scrupulous honesty requires that quotation marks should be used in such cases, and thoughtful readers always wish the author's name also, together with the name and date of the publication and the page of the book, so that the quotation may be verified and its context be examined, in order that there may be no doubt as to the author's meaning. The very fact that one author has need of the ideas contained in another authority in order to complete or confirm his own work suffices to show that the reader also will need to know what these authorities are; therefore, the author who values his reputation will be careful to give them in full.

When writing a special class of books, such as those for children, and when making popular addresses to miscellaneous audiences, it is proper to avoid pedantry and give less prominence to the quotations, yet there should always be some way of distinguishing them from the main text. There is no good reason why articles printed in newspapers and popular magazines should not clearly show the quotations and the sources, although this is sometimes omitted.

An abstract of another article when given in new words is not a quotation, but the original author should be named. When only a series of disconnected paragraphs is taken from other works the quotation marks belong at the beginning and ending of the series, and the intervals between the paragraphs are to be filled in with leaders. The fonts of type make provision for every emergency in the matter of quotations. Probably the neatest method is to print quoted matter in smaller type.

The most serious aspect of the omission of quotation marks and references to authorities is the reaction upon the reputation of an author. If he quotes a fine English composition without mentioning the source, it is called plagiarism, literary piracy, borrowing without acknowledgment, theft, stealing, deception, fraud, dressing up in stolen clothes. Not unlikely the pirate brings on himself a suit for damages from some indignant publisher. Almost certainly his own publisher, as soon as the fraud is discovered, cuts off the promised remuneration or honorarium. If his article has been contributed to a journal or periodical the editor informs him that no more communications will be accepted.

Even if an author quotes from an earlier work by himself or introduces into a new article extensive portions of some old one, he should state that he is doing so. No publisher would willingly print as new matter that which had been published and read before. It is only the very cheapest papers

and magazines that "will print anything" without asking questions, so as to fill up the columns, omitting notes or acknowledgments and assuming that the readers will not recognize the antiquity of the stuff, or care for the authority behind it.

It was in order to avoid the bad results injurious both to the Weather Bureau and the plagiarist that the Chief directed the publication of Circular Letter No. 11, State Weather Service Division, dated August 23, 1895.—C. A.

EARTHQUAKE-PROOF BUILDINGS.

Although earthquakes have but little to do with meteorology, yet, the fact that our three thousand observers so frequently make mention of them, demonstrates that the weather service could investigate the frequency and distribution of these visitors if only that were not a question pertaining especially to the province of the United States Geological Survey.

However, there is a practical application of our knowledge of earthquakes that accords entirely with the beneficent spirit that pervades the Weather Bureau, and that is worthy a place in the MONTHLY WEATHER REVIEW.

The studies of Mallet on the great Neapolitan earthquake of 1857¹ demonstrated that by following certain rules, buildings could be erected that should be proof against destruction by any special class of quakes or shocks, and such buildings have already been built in Japan. The modern tall steel frame buildings are almost certainly proof against any but the most violent shocks, such as that of Riobomba in 1797.

The engineer in charge of the completion of the Washington obelisk, Bernard F. Green, assured the Editor that it is proof against such earthquakes as those of Boston, 1755, and Charleston, 1887.

The natives of some tropical countries have been accustomed to regard the slight skeleton huts as "earthquake proof," and yet they always rush out into the open air when the shocks come.

The following letter from Mr. James H. Kimball, Observer United States Weather Bureau at the station at Modena, Utah, shows that even a rickety frame house, when supported on elastic posts, may rock to and fro without injury, when a building of brick or stone and mortar would crack or crumble:

The following extract taken from Journal notes of this date (November 13) at Modena, Utah, is forwarded in the hope that it may prove of special interest:

"Two distinct tremors were felt here to-night. The first at 11:33 p. m., seventy-fifth meridian time, and the second, after an interval of about ten seconds.

"The Oregon Short Line Depot, where the Weather Bureau office is located (about 37° 20' N.; 113° 10' W., in Iron County), is now undergoing repair and is supported on jacks. The building is, at best, a mere shell and jokes regarding it are common. So when the tremors occurred little attention was paid to them, as the explanation that some one had pushed the building seemed plausible, and readily suggested itself. However, the following observations were secured:

"The first tremor, 11:33 p. m., could be accurately reproduced, in a building of this kind, by striking a sharp, noiseless blow on the northeast side. The vibrations were rapid and had ceased in about two seconds.

"The second shock was unlike the first, except in time of duration. The individual waves were much longer, and the general effect more noticeable; the building swayed slightly, but small furnishings were not displaced. The same motion could be produced by a strong push.

"A decided tremor was felt at Lund, Utah, at 11:32 p. m. This was sufficient to stop the station clock. Lund is about 30 miles northeast of Modena.

"At Milford, 66 miles northeast of Modena, small packages were thrown from the shelves of the general store. No time could be secured.

"Tremors were reported from Paris, 132 miles northeast of Modena at 11:37 p. m."

¹ Robert Mallet, First Principles of Observational Seismology. London, 1862.